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AMERICAN GYNECOLOGICAL
SOCIETY.

SESSION OF 1877.

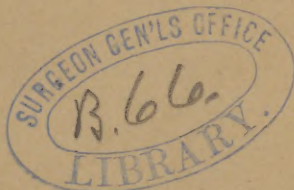
REPORT ON THE CORPUS LUTEUM,

BY

J. C. DALTON, M. D.,

PROFESSOR OF PHYSIOLOGY IN THE COLLEGE OF PHYSICIANS AND
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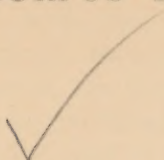
With the Author's Regards

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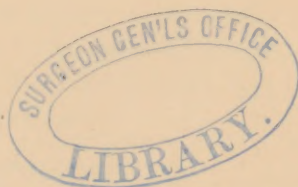
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REPORT ON THE CORPUS LUTEUM.

BY JOHN C. DALTON, M. D.,

New York.

SINCE the last meeting of the Society, when it gave me the honor of an invitation to prepare a report on the corpus luteum, I have endeavored to obtain such new material as would be useful for that purpose. I sent out a circular letter to a number of professional friends, asking of them the favor to send me the ovaries, unopened, from any autopsies made under their direction, in which the date of the last menstruation or pregnancy should be ascertainable. A very generous response has been made to this request. Since the first of December I have received, in good condition, thirty-two sets of specimens. A certain proportion of these were cases in which menstruation had been suspended, from illness or other causes, for a considerable time ; but nearly all were of value as contributing, in one way or another, to our knowledge of the corpus luteum. The whole number comprises eight cases in which death occurred, in non-pregnant women, within the four weeks of a regular menstrual interval ; six cases in which menstruation had been absent for from five to eleven weeks ; six in which it had been absent from four months to a year ; and two cases in which it had been absent for six years and over ; also four cases of abortion from the third to the sixth month ; and six cases of death from one to eight days after delivery at the full term or thereabout.

CORPUS LUTEUM OF MENSTRUATION.

The ten cases first to be enumerated illustrate the growth and retrogression of the corpus luteum, as connected with the menstruating condition.

CASE I. *Death within one day after the end of a menstrual flow. One Graafian follicle filled with coagulated blood.* — A married woman, forty-eight years of age, the mother of several children, died in New York, February 10, 1877, of exhaustion from epileptic mania. Her menstruation, as ascertained by her attending physician, Dr. Weir, had always been regular and painless; the last flow ceased a little less than twenty-four hours before death.

One of the ovaries contained a superficial Graafian follicle, considerably but not excessively enlarged, and filled with a fresh, dark-red, bloody clot. The recent date of the hemorrhage was shown by the color, consistency, and opacity of the coagulum; and by the smooth, unaltered condition of the wall of the follicle, which presented no perceptible thickening or folding of its substance.

Both ovaries exhibited alterations of structure, corresponding with the patient's time of life and the near approach of the menopause. These changes consisted in the deficiency of healthy, active Graafian follicles, and in the morbid distention or chronic shrivelling of others. But few healthy Graafian follicles were visible, and these were not more than from 2 to 3 millimetres in diameter. In the opposite ovary to that containing the freshly ruptured follicle was one greatly distended, with a uniformly smooth, translucent, vascular wall, and containing 18 cubic centimetres of a thin, amber-colored fluid. It showed no indication of a tendency to rupture, and was, to all appearance, in a condition of morbid, dropsical enlargement. In each ovary there were also two unruptured follicles, which had undergone chronic degeneration, as shown by a thickening of their walls, and by absorption of their contents. They had been converted into the shrivelled, compressed bodies, to be described hereafter as "false corpora lutea." These bodies varied in volume from 0.05 to 0.4 of a cubic centimetre, and in weight from 110 to 450 milligrammes. The largest was 13 mm. in length, by 9 mm. in width. The thickened wall of this follicle being from $1\frac{1}{2}$ to 2 mm. in thickness.

CASE II. *Death two days after the cessation of a menstrual flow. A recently ruptured and bloody Graafian follicle, just beginning its development into a corpus luteum.* — A widow, thirty-five years of age, died at the Charity Hospital, New York, January 14, 1877, after an illness of four days, from peritonitis extending from a local pelvic inflammation. Her last menstruation had continued for ten days (a longer period than normal with her), namely, from January 2 to January 12. This information was obtained through the attending nurse, who had, at one time during the above mentioned period, verified by inspection the presence of the menstrual flow.

One of the ovaries, which was of normal size and appearance, contained a recently ruptured, superficial Graafian follicle, filled with a fresh, bloody coagulum. When cut open through the site of the external cicatrix it presented a section measuring 15 millimetres in width, and 10 mm. in depth. (Figure 1.) Its surrounding wall was generally smooth, of an indefinite, semi-transparent, rosy color, and about one third of a millimetre in thickness. Only at its deepest part, was the wall slightly but distinctly folded for a limited space, where it exhibited a faint yellowish hue. The clot filling the cavity of the follicle was of a deep opaque red color, and of tolerably firm consistency. It was slightly adherent to the inner surface of the surrounding wall, but could be separated therefrom without difficulty by the forceps. The entire follicle, with its contents, could be easily enucleated from the ovarian tissue. Its volume was 0.4 cubic centimetre, and its weight 380 milligrammes.

In this case, the transformation of a ruptured and bloody Graafian follicle into a corpus luteum is shown at its earliest stage. The process consists in a thickening and folding of the wall of the follicle, with the subsequent development of a yellow color in its substance, and in the condensation, shrinkage, and gradual decolorization of the contained clot. The alterations in the follicular wall invariably begin,

so far as we know, at its deepest part, and thence extend over the remainder. Even when the development of the corpus luteum is far advanced, its surrounding wall often shows a marked preponderance, in thickness and convolution, about the bottom of the follicle; becoming thinner above and at the sides, until it reaches the border of the external cicatrix, where it altogether disappears. At an early period, therefore, the folding of the wall may be already progressing in its deep seated portion, though not visible elsewhere.

In the present instance, the contained clot was so fresh that its decolorization, if any existed, was inappreciable; and its slight adhesion to the surrounding wall was the only apparent change which had taken place in it since its effusion.

CASE III. *Death nine days after the patient was known to be menstruating. A corpus luteum well advanced in its development. Several traces of obsolete corpora lutea.*—

An unmarried woman, thirty-one years of age, of medium size and development, an inmate of the New York Hospital for Epileptics, Blackwell's Island, died January 12, 1877, after an illness of less than twenty-four hours. She had been in the hospital for seven years, affected with occasional epileptic attacks and considerable feebleness of mind, but otherwise in a healthy condition. At the date of her entrance into the hospital, menstruation was stated to be regular, and no irregularity had been known to occur since. She was last menstruating on the third day of January, according to her own statement made to the nurse at the time. The exact dates of the commencement and termination of the flow were not ascertained.

The uterus was natural in size and appearance. It contained only a few drops of a partially transparent, red, gelatinous magma, shown under the microscope to consist of uterine epithelial cells, mingled with red and white blood-globules. Its mucous membrane was smooth and pallid.

Both ovaries, of normal appearance and texture, contained numerous healthy Graafian follicles, from one to six millimetres in diameter, more or less concealed beneath the albuginea. One of them, more prominent than the rest, was slightly pointed, and covered only with transparent integument for a space of three millimetres in width.

The right ovary, which was the larger of the two, presented on one side, near its free border, a superficial, very dark, almost black spot, 1.5 by 2 mm. in diameter, surrounded by an irregular space of light yellowish hue. (Figure 2.) The dark spot was the point at which the rupture of the last Graafian follicle had taken place, and the surrounding yellowish border was due to portions of the corpus luteum showing through from within, owing to the transparency of the tissues. Immediately beneath this spot was the corpus luteum. It was of very soft consistency, and hardly distinguishable as a tumor by external palpation. When exposed by longitudinal section, it was found to be 12 mm. wide, 5 mm. deep, and 8 mm. thick. (Figure 3.) It consisted of a dull yellowish convoluted wall, one mm. in thickness at its deepest part, but thinning off to an imperceptible edge at the borders of the dark spot on the surface of the ovary. It contained a deep red, partially transparent, firmly gelatinous clot, which could be stripped off the inner surface of the convoluted wall. The whole corpus luteum, easily enucleated from the ovarian tissue, weighed 430 milligrammes.

In the left ovary, immediately beneath a depressed, superficial, linear cicatrix on one side of the organ, was an old corpus luteum, strongly compressed from within outward, presenting on section a width of 4 mm. and a depth of 1.5 mm. It consisted of a very thin, indistinctly convoluted, partly yellowish wall, with a central blackish cavity; the whole mass being so friable and adherent to the ovarian tissue that it could not be distinctly enucleated. There were also three other black or blackish spots on the surface of the ovary, 0.5 to 1 mm. in diameter, one of them par-

tially surrounded by a narrow yellowish border ; but none were connected with any distinct structures in the ovarian tissue beneath.

CASE IV. *Death ten days after the patient was known to be menstruating. A well developed corpus luteum, with light yellowish, strongly convoluted wall and a central, dark red bloody coagulum. Three older, obsolete corpora lutea, diminishing successively in size.* — An unmarried woman, about thirty years of age, somewhat above the medium size and weight, died at the New York Hospital for Epileptics, January 11, 1877, after an illness of one day. She had been in the hospital for ten months, affected with occasional epileptic seizures, of irregular recurrence. Her mental condition and general health were good. Her menses were stated to be regular, and she was known to have been menstruating on the first day of January. This information was obtained from another intelligent patient, one of her intimates, who also confirmed the fact of the habitual regularity of her monthly periods.

The uterus was rather large, corresponding in size with the general bodily development of the patient. The uterine mucous membrane was two millimetres thick, red, soft and velvety, smeared, at its lower part, with a minute quantity of thin light-red magma, which was seen under the microscope to consist of uterine epithelial cells and red blood globules in nearly equal quantities.

Both ovaries were considerably above the average size, and quite vascular internally. They contained an abundance of healthy Graafian follicles, from 1.5 to 6 millimetres in diameter, two or three of them being very superficial, and visible through the albuginea, which was thin and transparent at the corresponding points. One follicle was especially prominent and covered only by transparent integument for a space of seven mm. in width.

The right ovary was a little the larger of the two ; on its free border was a prominent, rounded, softish tumor, over the projecting portion of which the albuginea was wanting,



Fig. 1.
Menstruation -- 2 days.
CASE II.



Fig. 2.
Menstruation -- 9 days.
Ovary with external cicatrix.



Fig. 3.
Menstruation -- 9 days.
CASE III.



Fig. 4.
Menstruation -- 10 days.
CASE I.

or nearly so, for a space of about ten mm. in diameter. At this point the dark, purplish color of the tumor was visible from within, variegated with numerous small red superficial bloodvessels, and a few ill-defined tints of yellow. Near its summit was a distinctly marked, oval, funnel-shaped depression, almost like an orifice, one mm. long by one half mm. wide. The central parts of this depression were of a dark purple-red, nearly black color, its edges being bordered by a very narrow yellowish line.

Immediately beneath the depressed spot was a corpus luteum, forming the substance of the tumor. (Figure 4.) Its section was 14 mm. wide, by 13 mm. deep. It consisted of a lightish yellow exterior wall, very abundantly convoluted, and terminating at the edges of the external cicatrized orifice. It contained an opaque, dark red, firmly gelatinous, central clot, which was separable by forceps from the inner surface of the convoluted wall. The whole corpus luteum was easily enucleated from the ovarian tissue. Its volume was 0.7 cubic centimetre, and its weight 810 milligrammes.

The same ovary contained a second corpus luteum, similar in general structure to the first, but of inferior size, measuring 6.5 mm. in width, by 5.5 mm. in depth. Its central clot was smaller in proportion to the whole, and its wall much less abundantly convoluted. It was also more friable and adherent, so that it could only be enucleated piecemeal from the ovarian tissue. Its weight was 80 milligrammes. There was a third corpus luteum, still smaller, 6 mm. long, by 2.5 mm. wide, its central clot being very scanty and much decolorized, though still showing some reddish tint, like that of currant juice. The weight of this corpus luteum was 45 milligrammes. There was also a fourth, very small and much compressed, weighing only 22 milligrammes.

The left ovary presented on its free border a strongly depressed linear cicatrix, 2.5 mm. long, of a blackish color, beneath which there was a black staining of the ovarian

tissue for a depth of about 5 mm. There were also several colorless superficial cicatrices, without any definite structures in the ovary beneath.

CASE V. *Death probably at about the same period as in the two preceding cases. A well developed corpus luteum, with a strongly convoluted, yellowish-white wall, and a red, gelatinous, central clot. One obsolete corpus luteum, and indistinct traces of several others.* — A servant-girl, nineteen years of age, unmarried, of good size, well developed and well nourished, was smothered in a panic at church in New York, March 8, 1877, the case falling under the investigation of the coroner. Every effort was made to obtain information in regard to the girl's menstruation, but none could be elicited from her family or friends.

The uterus was empty, and presented throughout the strongly marked characters of a virgin uterus. Its mucous membrane was pale, smooth, and soft, smeared with a few drops of deep red semifluid magma, consisting mainly of red blood globules and uterine epithelial cells. There was only a slight trace of this fluid in the cavity of the cervix.

Both ovaries were plump, rounded, and fresh-looking, containing many healthy Graafian follicles, from 3 to 5 mm. in diameter. Two of the follicles were still larger, measuring from 8 to 10 mm. in diameter; and in each ovary there was one which protruded slightly above the general surface of the organ.

The right ovary, somewhat the larger of the two, presented, near its free border, a minute, punctiform, black spot, the mark of a ruptured follicle. Immediately beneath was a corpus luteum, which was too soft in texture to be felt externally as a tumor. Its section measured 16 mm. in width, by 9 mm. in depth. It consisted of a thin, indefinitely yellowish-white wall, very abundantly and intricately convoluted, and enclosing a small, deep red, soft, gelatinous, central clot, which was easily removable by the forceps. The whole corpus luteum could be enucleated

by careful manipulation. Its volume was 0.3 cubic centimetre, and its weight 280 milligrammes.

On the side of the ovary was another black, linear cicatrix, 1 mm. in length; and immediately beneath it a second corpus luteum, much smaller than the first, measuring 11 mm. in width, by 2 mm. in depth. Its exterior wall was of a faint, indefinite yellow, very friable, and containing a thin, scanty, tender, blackish clot, without any remaining tinge of red. Its volume was 0.05 cubic centimetre, and its weight 60 milligrammes.

There were, in addition, two other very thin, compressed, blackish stains in the ovarian tissue; and in the opposite ovary a minute blackish spot on the surface, with a black stain beneath. But neither of these spots exhibited the definite structure of a corpus luteum.

The foregoing case is detailed, notwithstanding the absence of definite information as to the date of menstruation, because the condition, both of the uterus and ovaries, was so similar to that in Cases III. and IV. as to make it highly probable that the patient was in the inter-menstrual period; and because it gives an additional illustration of the more important features of the corpus luteum in non-pregnant women.

CASE VI. *Death in the latter part of the intermenstrual period. Corpus luteum highly developed, of large size; wall much convoluted; central clot red. Five other corpora lutea, retrograde.* — An unmarried woman, twenty-four years of age, of full medium size, very healthy and well developed, a domestic in a family in New York, drank, on May 1, 1877, by mistake, a solution of cyanide of potassium used in cleaning silver, and died twenty minutes afterwards. Her menstruation was habitually regular; and at the time of her death she was in the latter part of the intermenstrual period, expecting a recurrence of the menstrual flow within a short time. This information was given by her roommate, another domestic, with whom she was on terms of intimacy. The autopsy was made on the day after death.

The uterus was empty, of rather large size, but presented, in form, texture, and appearance, the well marked characters of a virgin uterus. The mucous membrane of the cervix was thin and white; that of the body was everywhere thick, soft, and velvety, measuring from 7 to 8 millimetres in thickness. It was generally pallid, with a little fresh vascular arborization in front and rear. There was no appreciable amount of fluid in any part of the uterine cavity.

Both ovaries were generally normal in appearance and texture; containing healthy Graafian follicles, mostly from 3 to 5 mm. in diameter, some of them partly visible through the albuginea, but none prominent above the surface. The largest, in the right ovary, was 8 mm. in diameter.

The right ovary was slightly above the average size. On its free border was a uniformly rounded, oval prominence, 10 mm. by 7 mm. in extent, where the albuginea was wanting and replaced by a very thin transparent integument. At its middle there was a nearly circular dark purple-red spot, 3 mm. in diameter, surrounded by a yellowish zone, 1 mm. wide, in which the convoluted edge of the corpus luteum was distinctly visible. The whole prominence was of soft consistency, and was not perceptible to the touch as a defined tumor.

Immediately beneath it was the corpus luteum, much resembling those in Cases IV. and V., of an irregularly spheroidal form, with much infolding of its walls at various points; and measuring, at its greatest dimensions, 12 mm. in width, 15 mm. in depth, and 10 mm. in thickness. Its outer wall was of an indefinite, faint rosy hue, with a slight tinge of yellow; 0.5 mm. in thickness throughout, but excessively convoluted, and forming, at some points, by its contiguous foldings, an envelope 4 mm. thick. The central clot, which was continuous with the circular spot on the surface of the ovary, was uniformly dark red, semi-transparent and gelatinous; somewhat entangled by the folds of the convoluted wall, but still separable by the aid

of the forceps. In the ovarian tissue, immediately outside the convoluted wall, there was much dark red congestion. The whole corpus luteum was readily enucleated. Its volume was 1.1 cubic centimetre, and its weight 1,230 milligrammes.

At one end of the same ovary, near its free border, and immediately connected with a small, dark-colored, depressed superficial cicatrix, was a second corpus luteum, 6.5 mm. wide, by 4 mm. deep, consisting of a light stone-yellow convoluted wall, 1 mm. thick, and a very scanty blackish-brown central clot, of slight consistency. The whole was quite friable and enucleated with difficulty. Its volume was rather less than 0.1 cubic centimetre, and its weight 80 milligrammes.

There was also a third corpus luteum, of smaller size, situated beneath a superficial punctiform cicatrix. Its section, 2.5 millimetres in diameter, showed a yellowish gray wall, 0.25 mm. thick, enclosing a central cavity of dusky hue without any distinct remains of coagulum. It was not enucleable.

The left ovary, somewhat below the average size, presented on one side a dark punctiform cicatrix, and immediately beneath it an obsolete corpus luteum, strongly compressed from within outward, 7 mm. wide by 3 mm. deep. Its convoluted wall was of a light stone-yellow color; its central clot was nearly absent, and indicated only by a thin, semi-transparent, blackish-gray lamina, of little or no solidity. The whole was too friable and adherent to be enucleated. Near by was another obsolete corpus luteum, similar in structure to the last, but smaller, measuring only 2 mm. in diameter. There was also a third, smaller still, and nearly confounded, both in color and substance, with the contiguous ovarian tissue.

CASE VII. *Ovaries twenty days after the end of a menstrual period. One corpus luteum large and well developed; two others retrograde. A Graafian follicle prominent on the surface.* — The subject of this case was an unmarried

woman, twenty-four years of age, and slightly below the medium size, who had long suffered from exceedingly painful menstruation, of neuralgic or hysterical character. For the preceding three years the menses had recurred, with tolerable regularity, at intervals of five weeks, continuing for six or seven days each time. They appeared, as usual, November 29, 1876, January 7, and February 13, 1877. The last flow continued for six days. On the 11th of March following, both ovaries were removed, by abdominal section, by her medical attendant, Dr. W. C. Frew, of Ohio. At the time of the operation, a Graafian follicle was so prominent on the surface of the right ovary that it was accidentally ruptured by the hand of the surgeon, and its contents discharged. The ovaries were placed in a preservative fluid and sent to Prof. A. J. C. Skene, of Brooklyn, who transmitted them to me. The patient made a good recovery, and at the end of six or seven weeks was able to exercise in the open air, as she had not done for several years previously.

At the time of my examination, fifteen days after the operation, the ovaries had become quite pallid, both externally and internally, from immersion in the preservative fluid, which was tinged with a bloody hue. Both organs also appeared slightly swollen and stiffened, as if from imbibition of the preservative fluid. Otherwise they were in perfectly good condition.

Both ovaries were of large size, and contained beneath the albuginea an abundance of healthy Graafian follicles, from 1 to 4 millimetres in diameter; in the left ovary there were two follicles, from 6 to 9 mm. in diameter, very superficially situated, though not prominent on the surface.

The right ovary presented, at one end of its free border, a moderately prominent elevation, covered only by transparent integument, which contrasted strongly with the opacity of the albuginea elsewhere. Immediately beneath this elevation was a corpus luteum, 13 mm. wide, 14 mm. deep, 9.5 mm. thick. (Figure 5.) Its wall was of a dull



Fig. 5.
Menstruation - 20 days
CASE VII



Fig. 6.
Menstruation - 10 weeks.
a, b, Solidified Granular Follicles.
CASE IX.

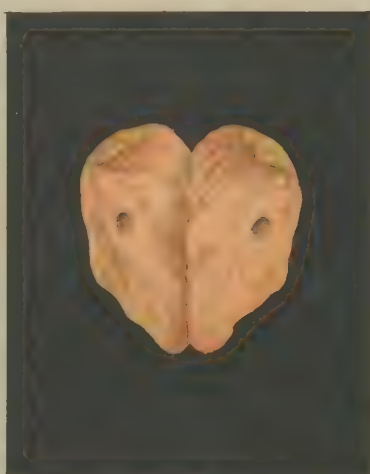


Fig. 7.
Menstruation - 11 weeks.
CASE X.

rosy hue, without any distinct tinge of yellow; 4 mm. thick at its thickest part, and abundantly convoluted, with much lateral infolding at several spots. The central clot was of a strong, rather dark, red color, semi-transparent, moderately firm in consistency, and still separable, for the most part, from the inner surface of the convoluted wall. The whole corpus luteum was easily enucleated entire from the ovarian tissue. Its volume was 1.1 cubic centimetre, and its weight 1,200 milligrammes.

On one side of the same ovary, immediately beneath a colorless, depressed, superficial cicatrix, was a second corpus luteum, of flattened form, 6 mm. in its longest diameter; consisting of an irregularly folded yellow wall, 0.5 mm. thick, and a scanty, colorless, central clot; the whole too friable and adherent to be enucleated from the ovarian tissue.

There was a third corpus luteum, also situated beneath a superficial cicatrix, still more obsolete, only 3 mm. in its longest diameter; but showing distinct traces of yellow color. It was not enucleable.

The left ovary, which was rather smaller than the right, contained no recognizable corpora lutea. There were no other remarkable appearances in either organ.

CASE VIII. *Death six weeks after menstruation. A corpus luteum, retrograde. Six others, in various stages of atrophy.*—A married woman, thirty-six years of age, of large size and remarkably well developed, died in Boston, March 17, 1877. Her health had been gradually deteriorating for six months; but her serious symptoms, which consisted of mental aberration, blindness, and afterward coma, began to appear only a few days before death. The autopsy showed some alteration in the kidneys, which had probably caused uremia. For the preceding two years menstruation had been more frequent than usual, recurring with tolerable regularity every three weeks. For one period it had failed to appear, the last menstruation having occurred six weeks before death. This statement was

made by the nurse, as well as by the sister of the patient, both of whom were sure of its correctness.

The uterus was rather small, firm, and empty; its mucous membrane thin, smooth, and of a grayish-white color.

Both ovaries were smaller than the average, but of normal appearance and texture. Internally they were uniformly red, containing many healthy, quiescent, Graafian follicles, beneath the albuginea, from 2 to 4 millimetres in diameter. There were none prominent on the surface.

The right ovary, a little the larger of the two, had, on the most prominent part of its free border, a dark circular spot, 3 mm. in diameter, surrounded by a light rosy-colored zone, caused by the presence of a corpus luteum beneath. When cut open, this body presented an irregularly oval section, 8 mm. in width, by 5 mm. in depth; its light rosy-yellowish wall beginning by a thin edge at the borders of the external cicatrix, and thence increasing in thickness toward the deeper parts. The central clot was 4 mm. in diameter, uniformly red and opaque, tolerably firm, more easily separated at the bottom of the cavity, more adherent about the external cicatrix. The whole corpus luteum was readily enucleated. Its volume was 0.1 cubic centimetre, and its weight 90 milligrammes.

The left ovary contained a corpus luteum of smaller size, 5 mm. wide by 3 mm. deep, very much flattened, and situated directly beneath a minute, punctiform, rather old-looking cicatrix on the surface of the organ. The wall of this corpus luteum was rosy-yellowish in color. The central clot was very scanty, semi-transparent, blackish-brown. The whole could be enucleated by careful manipulation, and weighed 50 milligrammes.

In the same ovary was a third corpus luteum, much smaller, connected with an obsolete-looking cicatrix on the surface. Its weight was 20 milligrammes.

Beside these bodies, there were, in the right ovary, four others, evidently of similar character, but diminishing rapidly in size, and in the remains of the central clot, which

in most of them was entirely wanting. They presented, for the most part, the appearance of small, flattened cysts, sometimes surrounded by a thin, dark-colored border, the central cavity being represented by a narrow blackish or brownish line.

A feature of some interest in this case is the unusual number of retrograde corpora lutea in the ovaries, connected with the frequent recurrence of the menstrual periods. The successive rupture of Graafian follicles, and the consequent formation of corpora lutea, had taken place with more than the usual frequency ; so that a larger number of these bodies coexisted in the retrograde condition, than are usually found together in the ovaries.

The quiescent condition of the Graafian follicles, corresponding with the final arrest of the menstrual function, is also noticeable, as compared with their active development in the preceding cases.

CASE IX. *Death ten weeks after menstruation. Two obsolete corpora lutea. No healthy Graafian follicles.*—A colored girl, rather below the medium size but pretty well developed, probably a prostitute, died of phthisis at the New York Colored Home, January 9, 1877. The date of her last menstruation, as reported by her to the attending physician, was October 29, 1876.

The uterus was empty, of natural size and appearance, except for a slight lateral flexion towards the right. The mucous membrane was thin and smooth, ruddy in the body of the uterus, pale in the cervix.

Both ovaries were very small and extensively bound down by old adhesions. Internally their substance was much altered by various tumors and infiltrations, to be described hereafter. There were no healthy Graafian follicles discoverable in either organ.

The left ovary contained, at one end, immediately beneath the surface, a small shrivelled corpus luteum, strongly flattened from within outward ; 6 millimetres in width, by 2 mm. in depth. (Figure 6.) It consisted of a very thin, puck-

ered, yellowish-white wall, with a central cavity marked by a black radiating line. It could only be enucleated piecemeal from the ovarian tissue. Its weight was 20 milligrammes. At the opposite end of the same ovary was another corpus luteum, similar in structure to the first, but of somewhat smaller size.

The right ovary contained no structure having any resemblance to a corpus luteum.

CASE X. *Death eleven weeks after menstruation. One small obsolete corpus luteum. Three others, successively diminishing in size. Graafian follicles nearly absent.* — A colored woman, twenty-four years old, of medium size and development, a prostitute, died of phthisis at the New York Colored Home, January 4, 1877. Her last menstruation, according to her own statement to the attending physician, occurred October 16, 1876.

The uterus was small, firm and empty; its mucous membrane uniformly smooth and pale.

Both ovaries were very small, and more or less enveloped in old adhesions. Their stroma internally was nearly natural in color and consistency; but in one of them there were no Graafian follicles to be found, in the other there was only a single follicle, less than two millimetres in diameter.

The right ovary presented, on or near its free border, several well marked, depressed, puckered, superficial cicatrices. Immediately beneath one of them was a corpus luteum, considerably flattened from within outward; 8 mm. in width, by 3 mm. in depth. (Figure 7.) It consisted of a very thin, clear, light-yellow wall, more or less irregularly folded, enclosing a colorless gelatinous residuum of the central clot. The whole could only be enucleated piecemeal. Its volume was 0.04 cubic centimetre, and its weight 15 milligrammes.

The same ovary contained two other corpora lutea, similar in structure to the preceding, but of smaller size. One of them measured 5 mm. in width by 1.5 mm. in depth; the other, 2.5 mm. in width by 1 mm. in depth.

The left ovary, beside one or two small gelatinous tumors, contained a third corpus luteum, similar to the others except for being still smaller and for having no perceptible remains of a clot in its central cavity. It measured 2 mm. in width, by 0.5 mm. in depth.

I am fully aware that the cases here presented are not sufficient to give a complete history of the corpus luteum in menstruating women. Wherever a condition of disease has existed, for even a short period, of sufficient gravity to induce at last a fatal result, this condition must be, in some degree, an element of uncertainty in interpreting the appearances found after death. It may have disturbed in some way the normal relations between the act of menstruation and the formation of the corpus luteum. It may have suspended, more or less completely, the menstrual flow, without preventing the growth and rupture of a Graafian follicle ; or, on the other hand, it may have arrested for a time the activity of the ovaries, while the uterine hemorrhage may have recurred as usual. In that case, it might lead to a mistaken estimate of the appearances presented at the autopsy. The most desirable thing, for exact physiological research in this direction, would be a record of deaths, from accident or violence, in healthy women, during the menstruating period of life, where the commencement, termination, and character of the last menstruation should be accurately known. But cases which combine all these conditions are very rare ; and those which are less complete may still yield valuable information, if collected and observed in sufficient number and with sufficient care. Especially if certain features in the history of the corpus luteum be found to agree in numerous instances, though accompanied by different diseases, this will remove much of the doubt as to their real physiological importance.

In reviewing the cases enumerated above, it is evident that they furnish additional testimony, if any such were needed, as to the close connection between the menstrual

process and the formation of a corpus luteum. The more recent the date of the menstrual flow, the fresher is the clot in the cavity of a ruptured Graafian follicle, and the less change has taken place in its surrounding wall. A few days later, the wall begins to be enlarged and thickened ; and this enlargement, within a confined space, causes it to become folded upon itself in short zigzag reduplications, mainly at the deeper part of the follicle. As the process goes on, the entire wall participates in the hypertrophy. Its convolutions are extended and multiplied, often in a very complicated manner. They project into the cavity of the follicle, encroach upon the central clot, and become pressed against each other, forming, by their coalescence, a thickened, glandular-looking envelope. Previously to the rupture of a Graafian follicle its wall is a uniformly smooth, vascular membrane, not more than one fourth of a millimetre in thickness. After the rupture, its thickness increases to one half a millimetre ; but as the foldings above described grow in number and in depth, and crowd against each other laterally, the apparent thickness of the envelope thus formed becomes much greater, and may reach three or even four millimetres, especially at the deepest part of the follicle.

In this way there is produced, during the intermenstrual period, a *corpus luteum*, occupying the substance of the ovary immediately beneath the superficial cicatrix which marks the site of the ruptured follicle. At this time the central clot is red and gelatinous, while the convoluted wall is of a light, rosy hue, mixed with more or less of a yellowish tint. Subsequently the whole structure diminishes in size, and the convoluted wall assumes a more decided yellow.

The existence, in the intermenstrual period, of such a corpus luteum, preponderating considerably in size over any others, and the rapidity with which its development is accomplished, indicate that it is a structure produced at short intervals and soon replaced by others of new formation. A

number of Graafian follicles approaching maturity are also visible at the same time ; one of them being almost always perceptibly larger and more prominent than the rest.

In cases where menstruation has been arrested for over four weeks, there is no such well developed corpus luteum to be found in the ovaries. That which was last formed has already passed into a retrograde condition, indicated by its smaller size and the distinctly yellow color of its surrounding wall. The central clot becomes gradually more shrunken and decolorized, and the wall less strongly convoluted. The whole structure is also more friable and adherent to the surrounding tissue, so that it cannot be separated, as readily as before, from the substance of the ovary. At first the corpus luteum can be enucleated entire, like a Graafian follicle, leaving behind a smooth bed in the ovarian tissue ; but after reaching a certain stage in its retrograde course, it can only be torn away by the forceps piecemeal, leaving an irregular surface of partially ruptured adhesions.

In a regular intermenstrual period there are, as a rule, several such obsolete corpora lutea, in addition to that which is in a condition of active growth. But when menstruation has been definitely absent for two or three months, as in Cases IX. and X., the obsolete corpora lutea are the only ones present, and there are no new follicles coming to the surface, to take part in their future formation.

The size of the corpus luteum, at any one period of its existence, depends upon the quantity of blood exuded into the follicle, and the activity of growth in its convoluted wall. Both these conditions may, no doubt, vary in different cases, according to the general development of the whole body, or the size, vascularity, and nutrition of the ovaries themselves. In the observations here recorded, the weight of the ovaries, when of perfectly normal structure, in menstruating or pregnant women of fair bodily development, varied from about 2.75 grammes to 8.20 grammes. Their average weight was a little over 5 grammes ; and in

rather more than one half the whole number the variation exceeded one gramme above or below this average, that is, twenty per cent. each way. Even in the same individual and in the healthy condition, the right and left ovaries are seldom of the same size. Only in a few of the above cases did the weight of the two ovaries come within ten per cent. of each other; and in more than one fourth of the number the difference between them was over twenty per cent. When either or both of the organs are the seat of structural alterations, or in cases of general wasting disease, their variation in size may be even more marked than this.

For these reasons we cannot expect an invariable standard of size for the corpus luteum, corresponding with its period of development. Still it evidently follows, during most of the intermenstrual period, a general course of enlargement, and afterward diminishes by a process of atrophy. The following list shows the weight of the corpus luteum, as actually observed in the eight cases in which its formation had fairly begun, and in which the date of menstruation was known.

WEIGHT OF THE CORPUS LUTEUM.

	MILLIGRAMMES
Case II. Two days after menstruation	380
Case III. Nine days after menstruation	430
Case IV. Ten days after menstruation	810
Case VI. Fifteen to twenty days after menstruation	1230
Case VII. Twenty days after menstruation	1200
Case VIII. Six weeks after menstruation	90
Case IX. Ten weeks after menstruation	20
Case X. Eleven weeks after menstruation	15

The possible extent of variation in this respect is illustrated by Case V., where the corpus luteum had apparently reached a grade of development not far from that in Cases III. and IV. while its weight was only 280 milligrammes.

The volume of the corpus luteum is indicated only in an approximate manner by the length and breadth of its cut

surface. Even the measurement of its thickness, in addition to its length and breadth, is not always sufficient for an exact estimate ; because this measurement varies so much in different parts of the same corpus luteum, owing to the irregular and sometimes excessive infolding of its walls at particular spots. The only method of determining its volume with precision is that by observing the quantity of water which it displaces in a narrow graduated tube. In the above cases, the volume of the corpus luteum, in the intermenstrual period, varied from less than one half a cubic centimetre to a little over one cubic centimetre. By the eleventh week after menstruation it was reduced to less than one twentieth of a cubic centimetre.

The next six cases show the condition of the ovaries after menstruation has been suspended for several months or years.

CASE XI. *Death four months after menstruation. No corpora lutea. Graafian follicles inactive.* — A married woman, thirty years of age, of medium size and development, died at the New York Hospital House of Relief, March 10, 1877, with uremic convulsions of about twelve hours' duration. She had not lived with her husband since the birth of her last child, four years previously. For three years her menstruation had been very irregular and nearly absent ; the last flow having taken place in November, 1876. This information was obtained from the woman with whom she had been living, in the same house and room, for a considerable time before her death.

The uterus was empty, of normal size and appearance for a multipara. Its mucous membrane was thin and smooth ; marked, in the body of the organ, with a moderately abundant arborescent vascularity. In the cervix, it was pale.

The right ovary was of full average size and free from adhesions. Its albuginea was very white and opaque, marked by several deep, linear, cicatrix-like depressions. The organ contained a considerable number of small and

moderately-sized Graafian follicles, none exceeding 5 millimetres in diameter. A few of the follicles were indistinctly visible from without through the albuginea, but none were prominent. The organ presented nothing abnormal excepting a hemorrhagic effusion, to be described hereafter.

The left ovary was below the medium size, somewhat bound down by old adhesions, and internally more or less condensed. It contained only a few Graafian follicles, the largest 4 millimetres in diameter, but none visible through the albuginea, which was everywhere thick, white, and opaque. There were no corpora lutea to be found in either ovary.

CASE XII. *No menstruation for six months. Three minute, doubtful, obsolete corpora lutea. A number of inactive, degenerated Graafian follicles.*—A woman, thirty-three years of age, a widow, above the average height, but much emaciated, died of phthisis at the Charity Hospital, New York, February 11, 1877. Her last pregnancy occurred thirteen years previously. Menstruation had been irregular for a year, the last flow having taken place six months before death.

The uterus was empty, and normal in appearance. Its mucous membrane was pale throughout.

Both ovaries were somewhat below the medium size, and more or less surrounded with old, bridle-shaped adhesions. The albuginea was generally white and opaque.

The right ovary had, near one end, a slight, rounded projection, with a brownish color showing through its thin and transparent integument. Immediately beneath this spot was an ovoidal body, from 3 to 4 millimetres in its longest diameter, having the general structure of an exceedingly retrograde corpus luteum of menstruation. It consisted of a convoluted wall, not more than one half a millimetre in thickness, and of a white color, without any remains of a yellowish hue. It enclosed in its cavity a little brownish gelatinous matter. Its weight, enucleated from the ovary, was 20 milligrammes.

Toward the opposite end of the same ovary was another similar body of smaller size, and not indicated by any external mark. Its weight was 15 milligrammes.

The left ovary contained a still smaller, very thin and shrivelled, white-walled sac, evidently connected with a superficial cicatrix. It enclosed, and was also surrounded by, a little blackish coloring matter.

Both ovaries contained a number of collapsed, empty, degenerate Graafian follicles, not connected with the surface, but scattered through the tissue of the organs. There were no other noticeable appearances.

The three bodies described above are mentioned as doubtful corpora lutea of menstruation, since they had no yellow color, and only one of them showed any distinct connection with an external cicatrix. But their superficial situation, the brownish color of their cavities, and the general features of their structure, make it altogether probable that they represented the obsolete remains of ruptured Graafian follicles.

CASE XIII. *Death eight months after menstruation. No corpora lutea or Graafian follicles visible.*—A woman, about thirty years of age, a prostitute, died at the Charity Hospital, New York, January 22, 1877, with waxy degeneration of the kidneys and disease of the liver. She had not menstruated for eight months before death.

The uterus was empty and of small size; its mucous membrane pale and smooth.

Both ovaries were completely enveloped in old adhesions. Their substance throughout was condensed and atrophied; so much so that in one of them the normal tissue of the organ was unrecognizable. The other ovary contained a few brownish or yellowish spots and streaks without definite structure; the largest not more than 1.5 millimetre in diameter. There were no corpora lutea or healthy Graafian follicles to be found in either organ.

CASE XIV. *No menstruation for ten months. Graafian follicles few, small, and inactive. No corpora lutea.*—A

woman, twenty-one years of age, probably a prostitute, of medium size and well developed, died at the New York Colored Home, January 21, 1877, of cardiac disease, with pulmonary edema. Her last menstruation occurred ten months before death, the menses having been regular up to that time.

The uterus was small and empty. The mucous membrane of the cervix was pale; that of the body very thin, but reddened with a uniform, fine vascularity.

The ovaries were of small size, but free from adventitious adhesions. Internally their tissue was abnormally dense, and contained only a very few Graafian follicles, the largest not over two millimetres in diameter. There were no corpora lutea recognizable in either organ.

CASE XV. *Ovaries one year after the menopause. No corpora lutea. Graafian follicles in a state of degeneration.*

—A woman, forty-three years of age, of average bodily development, who had had one child twenty-one years before, died at the Charity Hospital, New York, February 7, 1877, of cerebral meningitis. Menstruation had ceased within a few days of one year before death.

The uterus was empty, of medium size, and normal in appearance except for a constriction of the os internum, which was reduced to an orifice two millimetres in diameter. The uterine mucous membrane was generally smooth and pale, marked only with a slight arborization of fine blood-vessels.

The ovaries were somewhat undersized, and loose in texture. They contained a number of collapsed, empty, degenerate Graafian follicles, with slightly thickened walls, presenting the appearance of having been long in an inactive condition. One ovary contained ten or fifteen such bodies, the other from fifteen to twenty. In the ovarian tissue, there were also a few small, blackish stains without definite structure. There were no normal Graafian follicles anywhere, and no corpora lutea in either organ.

CASE XVI. *Death six years after the menopause. Ova-*

ries very small and inactive. No Graafian follicles or corpora lutea. — A woman, about fifty-five years of age, who had borne two children, died at the Charity Hospital, New York, February 1, 1877, from abscess of the liver and consecutive pneumonia. Menstruation had ceased about six years before death.

The uterus was rather small, empty, and its mucous membrane pale throughout. It contained a small fibrous tumor in its posterior wall, but was otherwise normal.

The ovaries were very small; one of them weighing a little less than a gramme and a half, the other only one gramme. Their external surface was opaque, yellowish white, and marked with numerous old, depressed, curvilinear or stelliform cicatrices. Internally they were of a pale rosy color, moderately firm in consistency. Neither of them contained anything like Graafian follicles or corpora lutea. Their whole substance was apparently made up of a moderately vascular connective tissue.

These cases serve to illustrate the negative history of the corpus luteum in its relations with menstruation. The final arrest of this function coincides with the disappearance of corpora lutea, as habitually present in the ovaries; while, at the same time, the Graafian follicles cease their active development, become less noticeable as constituents of the ovarian tissue, and pass into a state of quiescence or degeneration, or disappear altogether. The ovaries themselves, after a permanent inactivity of several years, may be reduced in volume to one quarter, or even one fifth of their average size.

IRREGULARITIES AND MORBID DEVIATIONS IN THE CORPUS LUTEUM OF MENSTRUATION.

There is evidence that the physiological activity of the ovaries, like that of other bodily organs, is liable to vary within certain limits, both in the order and intensity of its phenomena, and in its relation with other associated functions. Some of these variations have been observed in the present series of cases.

1. *Menstruation may take place without the rupture of Graafian Follicles or the formation of Corpora Lutea.*— Only one instance of this kind was met with, but it was so definite and well authenticated as to deserve a special record.

CASE XVII. *Regular menstruation without rupture of Graafian follicles or formation of corpora lutea.*— A young, unmarried girl, somewhat below the average size and development, died at the New York Hospital for Epileptics, January 11, 1877, after an illness of sixteen hours. She entered the hospital in October, 1876, for epileptic attacks, with which she had been affected since early childhood, her mental faculties being also very imperfect. At the time of her admission, the mother reported that she menstruated regularly. In November, about one month afterward, the nurse in attendance personally verified the fact that the girl was menstruating. In December she stated to the nurse that she was again menstruating. On the third day of January she objected to taking a bath at the customary time, assigning as a reason that her menses were present; and on this occasion the nurse again verified the fact by personal inspection. The discharge was, however, very moderate in amount. The patient's death took place eight days after this date.

The uterus was rather small, and firm in texture. The cervix contained some transparent, ropy mucus, mostly colorless, but slightly stained with blood at one spot. The body of the uterus contained a few drops of whitish, opaque fluid, which exhibited, under the microscope, only uterine epithelial cells and cell nuclei. The mucous membrane of this part was smooth and velvety, two millimetres thick, pale at the fundus and lateral edges, but with a faint rosy color at the front and back of the uterine cavity.

Both ovaries were normal in size and appearance. They contained an abundance of healthy Graafian follicles, from 1.5 mm. to 8 mm. in diameter, situated both in the deeper parts of the ovarian tissue, and immediately beneath the

albuginea, through which they were more or less distinctly visible. One of these follicles, on the free border of the right ovary, was especially large and prominent, and was covered only with transparent integument for a space seven millimetres in diameter. The general appearance of the organs was such as might be presented in a healthy young girl, just approaching the commencement of the menstrual function.

Both ovaries were thoroughly searched throughout, but there was no sign of a corpus luteum, and no certain indication that the rupture of a Graafian follicle had ever taken place. The only appearance which might possibly be referred to such a cause was at one point in the right ovary, immediately beneath the albuginea. It consisted only of a very thin, blackish, cicatrix-like, linear trace in the ovarian tissue, 6 mm. in length, and parallel with the surface of the albuginea. Below and around this trace, for a depth of about 6 mm., the substance of the ovary was stained of a blackish hue, without further deviation from its normal structure.

If we regard the rupture of an ovarian follicle, and hemorrhage from the uterus, in menstruation, as two phenomena normally coincident, excited by a common cause, and both subservient to the same general function, we must still recognize the possibility of either one being deranged independently of the other. In the above case it is certain that the uterine flow had been established, and had recurred at its regular intervals for at least four months, while the normal activity of the ovaries had from some cause been delayed. It seems probable, however, from the appearance of the organs at the autopsy, that this action would soon have commenced, had the patient remained in her usual health.

When the menstrual function, on the other hand, is approaching its end, either from advancing age or from the effects of chronic disease, we may anticipate the possibility of similar irregularities. The following is perhaps an instance of this kind.

CASE XVIII. *Death from phthisis. An imperfect menstruation five weeks beforehand. Graafian follicles inactive. Three corpora lutea, all small and retrograde.*—A mulatto woman, twenty-two years of age, a widow, below the medium size, died of phthisis at the New York Colored Home, February 1, 1877. The last menstruation, as reported by her to the attending physician, began December 27, 1876, and lasted only two days. Before that time her menstrual periods had been generally regular. Her disease had been in progress for nine months or more, and at the time of death she was much emaciated.

The uterus was of small size and empty. Its mucous membrane was pale throughout.

The ovaries, which were considerably smaller than the average, were marked externally by a number of old, depressed, linear cicatrices. Internally, their tissue was rather flaccid. No Graafian follicles could be found larger than from one to two millimetres in diameter; and none of them were prominent on the surface, or visible through the albuginea.

The right ovary presented on one side a depressed, dusky cicatrix, beneath which was a corpus luteum, much compressed from within outward, measuring 6 mm. in width by 2 mm. in depth. Its wall was very thin, of a distinctly yellow color, not perceptibly convoluted, too friable and adherent to be enucleated entire. The central clot was very scanty and of a blackish hue, without any tinge of red.

At another spot in the same ovary, also beneath a depressed, superficial cicatrix, was a second corpus luteum, similar in form to the first, but not more than one half its size, and of a less distinctly yellow hue. Its central clot was very scanty, and blackish.

There was also a third body, immediately beneath the albuginea, only 2 mm. in diameter, of a blackish color throughout, and without visible distinction between wall and clot; and finally a fourth, 1.5 mm. in diameter, con-

sisting of an extremely thin, white, irregularly folded wall, enclosing a flask-shaped cavity with a minute slate-colored, semi-transparent clot, and surrounded by a thin blackish stain of the ovarian tissue.

The left ovary showed in two spots a black staining of the ovarian tissue, corresponding with old, depressed superficial cicatrices, but no definite structure like that of a corpus luteum.

The largest of the corpora lutea found in this case hardly corresponds in general character with those of so recent an origin as five weeks. Its small size, its friability and adhesion to the adjacent tissue, as well as its scanty and decolorized central clot, are all features by which it resembles corpora lutea of an older date, like those in Cases IX. and X. It should probably be referred to the menstrual period of nine weeks before; the last incomplete menstruation having taken place without the rupture of a Graafian follicle.

2. *Formation of a Corpus Luteum without the Central Clot.*

The clot which occupies the central part of a corpus luteum during its earlier periods is one of its most striking features. Its quantity varies according to the abundance of the original hemorrhage, and it is sometimes encroached upon by the rapid growth of the surrounding wall. It disappears at last by reabsorption; but so long as the corpus luteum itself is of any considerable size, the central clot, or its partially decolorized residue, continues to form a noticeable part of the structure. Should the rupture of a Graafian follicle, however, take place without the usual accompanying hemorrhage, the corpus luteum, when formed, would have no central clot. I am not aware that this occurrence has been heretofore observed; and the following instance is not offered as being certainly a case in point. But it is at least sufficient to indicate the possible existence of such an irregularity.

CASE XIX. *Death from six to seven weeks after menstruation. A corpus luteum, normally retrograde but with-*

out a central clot. A second still more retrograde.—A woman, twenty-two years of age, of irregular life, rather above the medium size and well developed, died in Boston, March 31, 1877, of desquamative nephritis, with intercurrent renal congestion. The diseased condition of the kidneys was discovered at the autopsy, but the woman had been considered as in fair health until the evening before her death. The last menstrual flow had begun seven weeks before, and was normal in character; the following period, which should have begun three weeks before death, having from some cause failed to appear. This information was given very explicitly by one of the patient's female intimates, living in the same house; and also, in an equally positive manner, by the man with whom she had cohabited.

The uterus was rather small, and empty, except for a little opaline mucus in the cavity of the cervix. The mucous membrane in the body of the organ was pallid and soft, two to three millimetres in thickness, and smeared with a few drops of opaque, whitish fluid.

The ovaries were unusually voluminous, each organ being of rather more than twice the average weight. This was due in great measure to a deposit of abnormally dense tissue in the deeper part of the ovaries; while their more superficial portions were of natural consistency, containing numerous healthy Graafian follicles from 2 to 8 mm. in diameter.

Near the free border of the left ovary, beneath a small, punctiform, superficial cicatrix, was a corpus luteum 4 mm. in width, 6.5 mm. in depth, and 1.5 mm. in thickness. Its distinct, light-yellow wall was about 0.5 mm. thick, but formed by its foldings, in some parts, an envelope one or two millimetres in thickness. The inner surfaces of this wall were in loose contact with each other; enclosing a flattened cavity which may have held a small quantity of fluid, but which contained no clot, either bloody or fibrinous, and there was no indication that such a clot had ever existed. The cavity was directly connected with the cicatrix

on the surface of the ovary. The whole corpus luteum could be enucleated by careful manipulation, leaving a smooth bed in the ovarian tissue. Its weight was 65 milligrammes.

The right ovary contained a second, more obsolete, corpus luteum, measuring 5 mm. in its longest diameter, and 1 mm. in thickness. It consisted of a light-yellow wall, rather less than 0.5 mm. thick, and a colorless central clot, so scanty as to be hardly discernible. It could only be enucleated piecemeal. Its weight was 20 milligrammes. There were no other corpora lutea discoverable.

The larger corpus luteum in this case, except for the absence of a central clot, corresponded in character with a date of six or seven weeks, and was no doubt connected with the last menstruation; while the smaller one corresponded equally with a date of ten or eleven weeks. But there was no corpus luteum which could be referred to the period of three weeks before death, when the menstrual discharge had failed to appear.

3. *Hemorrhage into a Graafian follicle or the ovarian tissue, without the formation of corpora lutea.*—This irregularity also seems to be connected with disturbance or cessation of the menstrual function. A marked instance was that in Case XI., where menstruation had been irregular for three years and absent for four months, and where the ovaries contained neither corpora lutea nor actively developing Graafian follicles. In the right ovary, near its free border, there was a dark-red, opaque, rather soft and recent, bloody clot, occupying the cavity of a Graafian follicle. It measured 8 millimetres in its longitudinal, and 5 millimetres in its transverse diameter. The follicle containing this clot was unruptured, and entirely covered by the albuginea, which was continuous over it with a uniform thickness of one millimetre. The whole follicle, with the clot, was easily enucleated from the ovarian tissue, and weighed 70 milligrammes. In the following case the hemorrhage was still more abundant.

CASE XX. *Excessive and irregular menstruation. Hemorrhage into a Graafian follicle without rupture. Three obsolete corpora lutea.* — An unmarried woman, thirty-seven years of age, a prostitute of intemperate habits, died at the Boston City Hospital, May 8, 1877, of fatty disease of the kidneys and consecutive pulmonary congestion. Her menstrual flow was reported to have been for some time nearly continuous, up to a period of five weeks before death, when it ceased. Three days before death it reappeared, at the same time with symptoms of pulmonary congestion which terminated fatally.

The uterus was a little below the medium size, firm and empty. The mucous membrane of the cervix was pale; that of the body thin and smooth, but with a uniform light-red vascularity on its surface.

The right ovary was converted into an irregularly lobulated mass of enlarged Graafian follicles. One of the largest of these, from 20 to 25 millimetres in diameter, was filled with a nearly globular, dark-red, firmly gelatinous, recent-looking coagulum. The coagulum was slightly adherent at one spot, but was easily separated, and turned out entire, by the handle of the knife. The inner surface of the follicle was uniformly smooth and vascular, its walls firm and of normal or slightly increased thickness. There was no trace of a previous rupture, nor any indication that such was about to take place.

In the left ovary, which was rather small and covered with old adhesions, there were three obsolete corpora lutea, the largest 6 mm. in its longest diameter, the two others respectively about one half and one quarter the size of the first. There were no other remarkable appearances.

Another instance was that in Case XIV., where menstruation had been absent for ten months, and where there were no corpora lutea and only a few small Graafian follicles. One of the ovaries in this case exhibited upon its surface a few thin spots of bright and dark-red ecchymosis; and immediately beneath them were corresponding bright

and dark apoplectic clots, from 3 to 4 millimetres in depth, perhaps occupying the cavity of unruptured Graafian follicles, but apparently in the substance of the ovarian tissue. The opposite ovary contained one similar clot of smaller size.

In the following instance the clots, though very small, evidently occupied the cavity of ruptured Graafian follicles, and represented an irregular action of the follicles, in the absence of menstruation. The case also illustrates a peculiar form of alteration in the follicles, after becoming inactive.

CASE XXI. *Menstruation absent, or nearly so, for one year. Small hemorrhagic effusions, without corpora lutea. Graafian follicles enlarged and partly collapsed, others friable, others shrivelled and empty.* — A woman, forty-five years of age, who had been the mother of fourteen children, died at the Charity Hospital, New York, January 29, 1877, from the rupture of a thoracic aneurism. At the time of her admission to the hospital she reported that her menses had ceased one year before; but the flow recurred, in some measure, once during the month of January.

The uterus was of large size, but empty and normal in appearance. Its mucous membrane was pale, except for a little rosy tint near the fundus of the organ.

The ovaries were rather below the average size, whitish and opaque externally, with many strongly depressed intercommunicating cicatrices. Immediately beneath several of these cicatrices, in each ovary, were small, dark-colored, enucleable bloody clots; some with, others without, distinctly membranous walls. They were flattened in form, from within outward; the largest measuring 6 millimetres in length by 1 millimetre in depth.

The ovaries contained four or five small Graafian follicles, more or less visible externally. There were also two others, concealed beneath the albuginea, which were enlarged to 5 and 12 millimetres in diameter, but partly collapsed from reabsorption of their contents. The walls of

all these follicles, though natural in appearance, were abnormally friable, and easily ruptured in manipulation. There were several others, of moderate size, with thickened walls, collapsed and empty. There were no corpora lutea in either ovary.

4. *Blackish Discoloration in and around Old Corpora Lutea.* — This appearance is not very infrequent, as I have met with it more or less distinctly in from one third to one half of the cases observed. In most instances, as the corpus luteum passes into a retrograde condition, the central clot becomes semi-transparent and of a lighter red color; afterward of a mottled greenish or slightly brownish hue; and at last is completely decolorized. The blackish tint in question shows itself only in very old corpora lutea, which have become much reduced in size, and shrivelled or compressed. The central cavity, in such cases, sometimes appears as a slender black or blackish line, marking the inner boundary of the surrounding wall. (Figure 6.) The tint seems due, not so much to coloring matter in the coagulum itself, as to a stain of the inner surface of the convoluted wall, showing through the transparent remains of the enclosed clot. A similar discoloration is sometimes visible about the exterior of the corpus luteum; and in not a few instances there is a blackish stain of the ovarian tissue beneath old superficial cicatrices, where the corpus luteum has become so obsolete that it is no longer distinctly recognizable. In all these cases the black discoloration seems to be a remnant of vascular congestion, either in the walls of the corpus luteum, or in the adjacent ovarian tissue. Such a local congestion of the ovarian tissue is sometimes present, in a very marked degree, during the early development of the corpus luteum; and its vestiges may apparently remain for some time after the latter has disappeared. It is often traceable in the blackish or dusky hue of old cicatrices on the surface of the ovary.

5. *Gelatinous and Fibrinous Exudations into the cavity of Graafian Follicles.* — Exudations of this kind are altogether

morbid in character. They have nothing to do with menstruation, and are contained in follicles which have never ruptured. Gelatinous exudations were found in two instances, both of which were cases of phthisis, in which menstruation had been absent for ten and eleven weeks respectively. They were in the form of smooth, ovoidal, thin-walled cysts, from 8 to 12 millimetres in diameter, each filled with a semi-transparent, nearly colorless, firmly gelatinous mass, which could be easily pressed out entire, when the wall of the follicle had been cut open. The largest weighed 435 milligrammes.

The fibrinous exudations, two in number, were met with in Case IX. (Figure 6.) In this instance, about one half of the left ovary was occupied by an elongated tumor, 18 mm. long, by 9 mm. thick, situated immediately beneath the albuginea, and consisting of a uniformly solid, yellowish-brown, unorganized mass, surrounded by a thin blackish outline. It was easily enucleated entire, and weighed 510 milligrammes. The second tumor, in the same ovary, was about one third the size of the preceeding, and in contact with it. Its substance was white and fibrinous-looking, with a small rounded cavity near one end. Neither of the tumors presented any appearance of inflammatory action.

6. *Saccular Degeneration of the Graafian Follicles.*— This degeneration consists in a collapse of the follicle from re-absorption of its contents, together with slight thickening and condensation of its membranous wall. By this process the follicle loses its normal physiological character, and passes into a condition of permanent inactivity. I have met with it in nine cases, in the most marked of which menstruation had ceased for from half a year to several years. A few follicles may undergo this change in women from twenty to thirty years of age, in whom menstruation continues with regularity. But the larger number of cases, and those in which the degenerated follicles are most numerous, are farther advanced in life, when menstruation has either already ceased, or is approaching its termination. In

old age, all the follicles remaining in the ovaries may exhibit the same alteration.

The healthy Graafian follicle is globular in form, and consists of a thin, flexible, vascular, nearly transparent membranous wall, enclosing a clear, colorless fluid. When undergoing the saccular degeneration, its wall becomes thickened, opaque, whitish, and somewhat rigid, as if assuming a slightly cartilaginous consistency. The follicle is also a little puckered; and as its fluid contents disappear, it becomes collapsed, so that its opposite surfaces are in contact with each other. It is still distinct from the adjacent ovarian tissue, and may be readily enucleated by the forceps, as in the healthy condition.

In some cases the thickening of the follicular wall increases to 1.5 or 2 millimetres, and the degenerated follicle then presents an appearance of unusual solidity. This happened in Case XXV., where one of the ovaries contained, imbedded in its substance, an ovoidal sac, 8 mm. in length, by 5 mm. in width. (Figure 8.) Its wall was 1.5 to 2 mm. in thickness, of a dead white color, firm, and nearly homogeneous in texture, not distinctly convoluted, but enclosing an empty cavity with irregularly zigzag outlines. Its volume was 0.15 cubic centimetre, and its weight 77 milligrammes. The opposite ovary contained two similar bodies, of smaller size.

Such a formation as this is the only structure to be found in the ovaries which deserves the name of a "false corpus luteum." It could hardly be mistaken, however, for a genuine corpus luteum except on very superficial examination. The most obvious distinction between the two is as follows: The real corpus luteum is superficial in situation. It is formed from a ruptured Graafian follicle, and its central cavity, with the contained clot, is always connected with a cicatrix on the surface of the ovary. The "false corpus luteum," on the other hand, is a Graafian follicle which has never ruptured. It is often deeply seated in the substance of the ovary, and it is not connected with any external cica-



fig.8.
False corpus luteum.



fig.9.
Pregnancy-2 to 6 months.
CASE XXIII.

trix. The white color of its puckered wall, and the absence of any clot or residuum in its central cavity, are additional marks which serve to fix its character.

In size the degenerated follicles usually measure from 3 to 5 millimetres. Sometimes, as in the case above mentioned, their longest diameter may reach 8 millimetres. The largest were met with in Case I., where there were four of these bodies, two of them measuring from 12 to 13 millimetres in length, and each weighing over 400 milligrammes.

The most characteristic example of this degeneration was in the following case, where menstruation had long ceased from old age, and where a large number of follicles presented the same appearance.

CASE XXII. *The ovaries in old age. Saccular degeneration of all the Graafian follicles.*—A woman, seventy years of age, large and well-developed, who had been the mother of two children, died at the New York Colored Home, January 22, 1877.

The uterus was healthy, except for a small, fibrous tumor in one of its walls, and some thickening and redness of the adjacent mucous membrane.

The ovaries were both small, being only a little over one half the average size. Internally they presented a somewhat lobulated appearance, containing throughout numerous collapsed Graafian follicles, in the form of closed, empty sacs, from 2 to 3 mm. in diameter, with pale, slightly thickened and puckered walls, of firm consistency. The sacs could be easily enucleated by the forceps, the space between them being occupied only by loose, rosy-colored connective tissue. There were no healthy Graafian follicles, or any other structural formations noticeable in either ovary.

CORPUS LUTEUM OF PREGNANCY.

The general characters of the corpus luteum of pregnancy are sufficiently well known. After the first month

it continues to increase in size, or, at least, does not diminish ; and its convoluted wall assumes the strong, yellow hue which has given rise to its name. At the same time, the central clot becomes fully decolorized without losing greatly in substance, growing denser and firmer, in proportion as it diminishes in bulk. Consequently the corpus luteum, by the end of the second month, appears as a voluminous yellow envelope, surrounding a white, tolerably firm, fibrinous coagulum. Sometimes a few fine blood vessels penetrate through the external cicatrix to the inner surface of the convoluted wall, giving rise to an appearance of spots or stains showing through the fibrinous clot ; but the clot itself is by this time colorless. The whole forms a flattened, roundish, or ovoidal mass, of sufficient consistency to be felt as a well-defined tumor in the substance of the ovary.

One of the variations in the structure of the corpus luteum at this time is due to the presence or absence of a central cavity in the fibrinous clot. As a general rule, the clot is continuous and of uniform solidity throughout. But sometimes there is, in its central part, a well defined cavity or excavation, with smooth walls, and similar in form to the clot itself. In the ten cases of pregnancy of the present series, I have met with this peculiarity three times ; and in forty-six corpora lutea of pregnant women, recorded or figured elsewhere, it occurred sixteen times ; making, in all, about one third the whole number of cases. It seems to be due to a special retention of serum during the absorption of the clot. When the central coagulum is becoming condensed by the separation and absorption of its serous ingredients, a part of this fluid, instead of being taken up by the surrounding tissues, accumulates as a distinct deposit in the middle of the coagulum, thus forming a small cavity at that point. It is not very plain why the same thing should not happen in the corpus luteum of menstruation, but, in point of fact, it does so very rarely. I have never seen such a cavity in the corpus luteum of menstruating women, and

know of but one recorded instance of that kind.¹ Whether the slower growth and progress of the corpus luteum in pregnancy may be favorable to the accumulation of serous fluid in a distinct cavity, I have no means of determining.

1. *Changes in the Corpus Luteum during Pregnancy and after Delivery.* — Beyond a certain period of pregnancy, the date of which is not precisely known, the corpus luteum diminishes in size, and loses the freshness of its yellow hue. It still retains the characteristic features of its original structure, and the connection of its central clot with the surface of the ovary continues visible throughout. At the same time its different parts become more closely adherent to each other, and the central clot often assumes the appearance of a whitish, radiating or star-shaped, cicatrix-like mass. At the end of pregnancy the corpus luteum is reduced in volume to about one half of a cubic centimetre, and in weight to about 500 milligrammes.

The appearance of the ovaries is further modified, during pregnancy, by the disappearance of the earlier corpora lutea and the inactivity of the Graafian follicles. In menstruating women it seldom happens that we do not find three or more corpora lutea existing together in the ovaries, in different stages of growth or retrogression. But pregnancy arrests, for the time being, the discharge of ova and the formation of new corpora lutea. The Graafian follicles do not disappear from the ovarian tissue, or become degenerated, as after the menopause; but they cease to enlarge, and remain for the most part concealed beneath the albuginea. When gestation, therefore, has advanced to its middle or later periods, there is but one corpus luteum to be found in the ovaries. Those of a previous date have by this time disappeared, and no subsequent production of them has taken place. The physiological exceptions to this rule are easily understood. In twin or triplet pregnancies we should, of course, find a corresponding number of corpora lutea in the ovaries; and it is evident that two Graafian follicles

¹ Leopold. *Archiv für Gynäkologie*. Berlin, 1877. Band XI., s. 129.

might rupture simultaneously at the time of conception, and but one of the ova become impregnated or reach maturity. In that case we might find only one fœtus in the uterus, and two corpora lutea in the ovaries. But these corpora lutea would be manifestly of the same age and development, and neither of them would resemble the retrograde structures in the ovaries of menstruating women.

CASE XXIII. *Death nine days after abortion in early pregnancy. Corpus luteum fully developed, with a central cavity. Graafian follicles small and quiescent.* — A colored woman, twenty-five years of age, rather below the medium height, but strong and well developed, died in New York, April 7, 1877. She had had an abortion, without medical attendance, nine days before, and attempted to conceal the fact until she became ill several days afterward and was seen by a physician. She reported to him that she had been not more than two months advanced in pregnancy. From her appearance, as observed by her friends, the pregnancy might have been as early as this, but could not be as late as six months. From the condition of the uterus, as seen at the autopsy, it should probably be reckoned at three months. Death resulted from general peritonitis.

The uterus was enlarged to more than five times its normal size; weighing, when stripped of all accessory parts, 274 grammes, its walls being thickened in proportion. The mucous membrane of the cervix remained entire. That of the body was wanting throughout; and at the upper part, of the posterior uterine wall, the former attachment of the placenta was indicated by a ragged brownish prominence, 40 to 50 millimetres in diameter, and 3 to 5 millimetres in thickness.

The situation of the corpus luteum, in the right ovary, was distinguishable externally by a roundish, superficial, cicatrix-like spot, surrounded by an indistinct yellowish zone. The corpus luteum, immediately beneath, was 15 mm. wide, 10 mm. deep, and 5 mm. thick. (Figure 9.) Its

outer wall was of a clear, orange-yellow color, quite thin in its superficial portions, 1 mm. thick elsewhere, but often increased by its foldings to a thickness of 2 mm. The central clot was of firm consistency, uniformly decolorized and white for the greater part of its extent. Immediately beneath the superficial cicatrix it presented some dark bloody discoloration, apparently due to the inflammatory congestion of the ovarian integument, which was strongly marked. In the centre of the fibrinous coagulum was an oval excavation, of flattened form, without any separate lining membrane. The whole corpus luteum was easily enucleated. Its volume was 0.9 cubic centimetre, and its weight 1015 milligrammes.

The left ovary, which was smaller than the right, contained nothing unusual. In each organ there were a number of Graafian follicles, from 1 to 3 mm. in diameter, beneath the albuginea. There were none of larger size, and none prominent on the surface.

The following five cases illustrate the condition of the corpus luteum at the end of gestation and within a few days after delivery.

CASE XXIV. *Death soon after delivery at term. Corpus luteum well developed. Graafian follicles inactive.*—A married woman, thirty-six years of age, of medium size and well nourished, was delivered in Brooklyn of a fully developed child, November 29, 1876. She was almost immediately attacked by well marked uremia, of which she died fifty-one hours after delivery.

One of the ovaries, which was of large size, contained a corpus luteum, easily perceptible to the touch externally, and marked by a distinct cicatrix on the surface of the organ. A slender band of adventitious tissue, containing one or two fine blood-vessels, was attached to the cicatrix, which was also surrounded by a rather abundant superficial vascularity.

The corpus luteum, exposed by a section through the cicatrix, was 12 mm. wide, 9 mm. deep, and 7 mm. thick.

(Figure 10.) Its wall was of an indefinite rosy-yellowish color, deeply convoluted, 3.5 mm. thick at its deeper part, but diminishing to 1.5 mm. near the superficial cicatrix. Exactly at the situation of the cicatrix it was entirely wanting, as in corpora lutea of earlier date. Numerous minute blood-vessels were visible in the interstices of its convolutions. The central portion of the corpus luteum was occupied by a solid, compressed, perfectly decolorized clot, of firm consistency, tolerably adherent to the inner surface of the convoluted wall, but still capable of being detached by careful manipulation. The whole, enucleated from the ovarian tissue, weighed 500 milligrammes.

Both ovaries contained, beneath the albuginea, an abundance of healthy Graafian follicles, all quiescent, and none larger than from 1.5 to 2 mm. in diameter. There were no other corpora lutea.

CASE XXV. *Death a few hours after delivery. Corpus luteum of moderate size. Graafian follicles inactive.*

— An unmarried woman, twenty-one years of age, somewhat below par in size, general development, and vitality, died December 29, 1876, at the New York Hospital House of Relief, eight hours after delivery, with uremic convulsions and pulmonary edema. The child was still-born and had apparently been dead for a few days; but its development indicated an age of at least eight and one half months.

The condition of the uterus was that usually presented within twenty-four hours after delivery at term.

The right ovary, of nearly the average size, had upon its surface, at one end, a depressed, curvilinear cicatrix, immediately beneath which the solid tumor of the corpus luteum was plainly perceptible to the touch. Exposed by section, it was 15 mm. in width, 10.5 mm. in depth, 5 mm. in thickness. Its convoluted wall was of an indefinite yellowish hue, enclosing a solid, white, radiated fibrinous mass, which communicated at one point, by a narrow, ribbon-shaped process, with the external cicatrix. The fibrinous clot was



Fig. 10.
Pregnancy at term.
CASE XXIV.



Fig. 11.
Three days after delivery.
CASE XXVI.



Fig. 12.
Eight days after delivery.
CASE XXVIII.

so entangled with the convolutions of the surrounding wall that it could not be extricated from them ; but the corpus luteum could be enucleated as a whole from the ovarian tissue. Its volume was 0.4 cubic centimetre, and its weight 363 milligrammes.

The left ovary, which was somewhat larger, contained, beneath the albuginea, an abundance of quiescent, healthy Graafian follicles, from 1.5 to 3.5 mm. in diameter.

CASE XXVI. *Death three days after delivery. Corpus luteum with a central cavity. Graafian follicles inactive.*

— An unmarried woman, twenty-five years of age, of full medium size, and well developed, was delivered, February 22, 1877, at the King's County Hospital, New York, of a living child, at full term ; and died, three days afterward, of double pneumonia.

The right ovary, which was somewhat above the average size, contained the corpus luteum, situated immediately beneath a slightly depressed, punctiform cicatrix, on the lateral surface of the organ. The corpus luteum measured 12 mm. in width, by a little over 3 mm. in depth. (Figure 11.) Its wall was of a dull yellow hue, and rather homogeneous-looking in texture ; its convoluted form being indistinct, owing to the absence of radiating fibrinous laminae. The wall was, for the most part, 1.5 mm. thick ; but it diminished suddenly in thickness as it approached the surface of the ovary, and was entirely wanting at the situation of the external cicatrix. The central clot, firm and perfectly decolorized, enclosed in its middle an empty flattened cavity, the sides of which were nearly in contact with each other. The clot was thus reduced to the form of a white, fibrinous, sac-like layer, in contact with the inner surface of the yellow wall, and surrounding a central cavity. This sac-like layer was continuous throughout, as much so at the situation of the external cicatrix as elsewhere ; showing that it was not a dependence or outgrowth of the wall of the follicle, but a remnant of the effused central clot. The corpus luteum was still enucleable, leaving

a smooth bed in the ovarian tissue. Its volume was 0.35 centimetre, and its weight 310 milligrammes.

Both ovaries contained many Graafian follicles, from 1.5 to 3 mm. in diameter, some partially visible through the albuginea, but none prominent.

CASE XXVII. *Death four days after delivery at term. Corpus luteum small and retrograde. Graafian follicles inactive.*—A married woman, primipara, somewhat above the medium size, and well developed, was delivered, February 1, 1877, at the Charity Hospital, New York, of a living child at the full term, and died four days afterward of puerperal peritonitis.

One of the ovaries, a little larger than the average, presented, on its lateral surface, near one end, a depressed, punctiform cicatrix. Beneath this was a corpus luteum 13 mm. wide by 5 mm. deep. Its wall was of a dim, pale, yellowish hue, and so thick as to constitute the main part of its substance. Its convolutions were indistinctly marked, owing to their mutual compression and the nearly complete absence of radiating, fibrinous partitions between them. The central clot was scanty and perfectly white. The whole corpus luteum, enucleated by careful manipulation, had a volume of 0.2 cubic centimetre, and weighed 270 milligrammes.

Both ovaries contained a number of healthy, quiescent, Graafian follicles, beneath the albuginea, mostly very small; none of them larger than 3 mm. in diameter, and none prominent on the surface.

CASE XXVIII. *Death eight days after delivery at term. Corpus luteum small and retrograde. Graafian follicles inactive.*—A woman, twenty-two years of age, primipara, of full medium size, and well nourished, was delivered of a living child, at the Charity Hospital, New York, December 10, 1876. The next day she showed signs of peritonitis, which increased in severity, and terminated fatally, December 18.

One of the ovaries, a little below the average size, had

upon its surface numerous spots of dark, punctiform, bloody congestion. Immediately beneath a small, slightly depressed, reddish, superficial cicatrix was a corpus luteum, 11 mm. in width, by 7 mm. in depth. (Figure 12.) Its convoluted wall, which had a maximum thickness of 2 mm., was pale yellowish in hue, and marked in many places with fine, white, cicatrix-like, radiating streaks. The central clot was thin, perfectly decolorized, and closely adherent to the convoluted wall. The whole corpus luteum was deficient in solidity, and could be enucleated with difficulty, bringing with it, in places, small adherent strips of the ovarian tissue. Its weight was 270 milligrammes.

The same ovary contained, beneath the albuginea, numerous pale, flabby, and inactive Graafian follicles, from 2 to 3.5 mm. in diameter.

The opposite ovary was much swollen and infiltrated, and was covered with a thick layer of recent inflammatory exudation. Its tissue was pale and friable, containing a few Graafian follicles from 3 to 5 mm. in diameter.

2. *Variation in size of the Corpus Luteum, from defective local or general Development.* — It is evident, from the foregoing cases, that the corpus luteum, at the end of gestation and within a few days after delivery, may vary perceptibly in size in different individuals; and this variation does not always exactly correspond with the size of the ovary or the general development of the whole body. But where either one of these conditions is considerably above or below the average, it may account for a similar variation in the corpus luteum. This is probably illustrated by the two following instances, where the size of the corpus luteum was much below the usual standard.

CASE XXIX. *Death four days after delivery. Corpus luteum unusually small and soft.* — A woman, twenty-five years of age, considerably undersized, feeble, and ill-developed, of pallid, sallow complexion, a primipara, was delivered of a living child, at full term, December 17, 1876, at the Nursery and Child's Hospital, New York. She died from septicemia four days afterward.

In the right ovary, which was of unusually flattened form, there was a corpus luteum, 12 mm. wide, 9 mm. deep, and 3 mm. thick. It was, therefore, like the ovary, of fair dimensions as to length and breadth, but very thin from side to side. Its convoluted wall was of a dull, yellowish hue; and the central clot, perfectly decolorized, was in the form of a thin, radiating cicatricial lamina, so entangled with the surrounding wall and adherent to its substance that it could not be separated. It was connected with the surface of the ovary by a narrow, thread-like band, indicating the original point of rupture. The whole corpus luteum was very deficient in consistency, and hardly distinguishable by the touch externally. Its volume was 0.2 cubic centimetre, and its weight 185 milligrammes.

CASE XXX. *Death five days after abortion. Corpus luteum very small.* — A married woman, a mulatto, multipara, thirty-six years of age, of slender figure and deficient bodily organization, died in New York, March 8, 1877, from peritonitis, five days after an abortion. According to her own calculation, her pregnancy had advanced to the fifth month; and the appearance of the fœtus, as seen by the attending physician, corresponded with that estimate.

Both ovaries were small, thin, narrow, pallid, and flabby. One of them contained a very few small Graafian follicles; none were visible in the other.

In the left ovary, which was between one half and two thirds the average size, was the corpus luteum, situated beneath a superficial cicatrix. It measured 8 mm. in width by 5 mm. in depth. Its convoluted wall was of a strong orange-yellow hue, with a maximum thickness, in its longitudinal section, of 3 mm. The central clot was white, firm, of a radiating, cicatrix-like form, and not separable from the yellow wall. The volume of the whole corpus luteum was 0.1 cubic centimetre, and its weight 100 milligrammes. There were no other corpora lutea in either ovary.

3. *Changes in the Corpus Luteum after Abortion or*

Death of the Fœtus.—It would be very desirable to know what modifications, if any, take place in the corpus luteum, where the fœtus has perished during pregnancy, but is retained in the uterus for some time afterward. Does its nutrition go on, in these cases, as if gestation had proceeded in the usual manner; or does it cease growing, with the death of the fœtus, and become prematurely retrograde? I hoped to find, in the present series of cases, some which would have a bearing on this point; but none have proved sufficiently definite to give any certain result in this direction. The only instance in which the fœtus had been dead for some days before delivery was that of Case XXV.; and in this instance the rather small size of the corpus luteum might be accounted for by the inferior development and vitality of the mother. It was also larger than in Cases XXVI. and XXVII., where death occurred three and four days after delivery, and where the size and general development of the body were good.

There is a similar question with regard to the history of the corpus luteum after abortion. In cases of sudden death, during or immediately after abortion, the corpus luteum represents, of course, the corresponding period of pregnancy. But when death is delayed for a certain period after abortion does the corpus luteum, during this time, change in volume and structure as rapidly as it would do after delivery at term? Furthermore, does the presence of peritonitis, or other acute disease, either hasten or retard, in any degree, the normal changes in the corpus luteum? Both these questions might be of importance under some circumstances, provided we could give them a definite answer.

In the cases here presented the evidence on these points seems to be doubtful. Leaving out of consideration those in which the general bodily development was defective, there are only the two following instances where the small size of the corpus luteum might have been due to a rapid change taking place after abortion. In one of them, death was caused by peritonitis; in the other by uremia.

CASE XXXI. *Death seven days after abortion. Corpus luteum small.* — A married woman, twenty-six years of age, of full medium size and well developed, died in Boston, March 25, 1877, seven days after abortion near the third month of pregnancy. The autopsy showed abundant inflammatory exudation in the peritoneal cavity.

The right ovary was very large, loose and infiltrated, its surface covered with recent inflammatory exudation, and several purulent deposits in its interior.

The left ovary, which was free from local inflammatory alteration, was of medium size, but very long and narrow, almost ribbon-shaped, in figure. Under one of its lateral surfaces was a corpus luteum, corresponding in form with the ovary, being 15 mm. in length, 6 mm. in width, and 3 mm. in thickness. Its convoluted wall was of a bright orange-yellow color, with a maximum thickness of 2 mm. Its central clot was solid, perfectly decolorized, quite firm and adherent to the surrounding wall. The volume of the entire corpus luteum was 0.3 cubic centimetre, and its weight 250 milligrammes.

CASE XXXII. *Death twelve days after abortion. Corpus luteum with a central cavity; small and somewhat retrograde.* — A married woman, twenty-six years of age, rather below the medium size, but strong and well developed, aborted at the end of the sixth month of pregnancy, January 31, 1877, and was taken to the New York Hospital House of Relief. A few days afterward she had suppression of urine, and died of uremia February 12. The kidneys were fatty and enlarged.

The right ovary, a little over four fifths the average size, contained, near one end, a corpus luteum which was perceptible to the touch as a soft, rather ill-defined, roundish, flattened tumefaction. Exposed by section, it was 8 mm. in width, by 7 mm. in depth. Its wall was from 1 to 1.5 mm. in thickness. It had no distinctly yellow tinge, but was of a deep, rather dull rosy-red color, similar to that of the adjacent ovarian tissue, from which it was separated by a dis-

tinct whitish line of demarcation. Its convoluted structure was nearly or quite imperceptible, but it had the usual glandular-looking texture of a corpus luteum in the later periods of pregnancy. Its central clot, perfectly decolorized, was in the form of a thin, rather rigid, white, fibrinous layer, surrounding a small cavity. The cavity had probably contained a little fluid, as it remained somewhat open and gaping after section. The whole corpus luteum was readily enucleated from the ovarian tissue, and weighed 180 milligrammes. The opposite ovary contained nothing remarkable.

In these two instances, the small size of the corpus luteum could hardly be attributed to anything else than the time which had elapsed since the abortion. But, on the other hand, in Case XXIII., where death occurred nine days after abortion, the corpus luteum showed no remarkable diminution of size or alteration in structure. That was also a case of peritonitis; and if this disease may sometimes reduce abnormally the volume of the corpus luteum, it does not always have that effect, and probably acts only in connection with other causes at present unknown. On the whole, our knowledge is very deficient as to the changes which take place in the corpus luteum immediately after abortion; and the subject is sufficiently important to deserve further attention.

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